#8

ANNOUNCING!

PLANT DEVELOPMENT WORKSHOP

SATURDAY, APRIL 4, 1981 9:30 A.M. - 4:30 P.M.

DEPARTMENT OF PLANT SCIENCES
UNIVERSITY OF WESTERN ONTARIO
LONDON, ONTARIO

All those interested in Plant Development - at all levels - are invited to the 8th Plant Development Workshop for a day of discussion and exchange of ideas. We especially encourage Graduate Students to present their ideas and work either verbally (15 minutes) or by poster.

Preliminary Schedule:

9:00 - 9:30	Coffee & Registration
9:30 - 12:00	Contributed papers
12:00 - 2:00	Lunch and Poster Presentation
2:00 - 4:00	Contributed papers and discussion

Please submit titles and brief abstracts by MARCH 27.

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The University of Western Ontario

8TH PLANT DEVELOPMENT WORKSHOP

UNIVERSITY OF WESTERN ONTARIO APRIL 4, 1981

9:00 - 9:45	Reception and Coffee Room 217, B&G
	PRESENTATIONS Room 22, B&G
9:45	Correlation of Reproductive Anatomy and Behavior in Individuals of *Crataegus crus-galli* and *C. punctata*. T. A. Dickinson and J. B. Phipps (U.W.O.)
10:00	A Fresh Look at the Significance of Peroxidase and Plant Cell Development R. B. van Huystee (U.W.O.)
10:15	Leaf Surface Wax Analysis of Corn. T. Blaker (U.W.O.)
10:30	Root Anatomy and Silicon Distribution in the Bamboo *Sasa palmata* Daphne M. Bennett and A. G. Sangster (Glendon College, York University)
	BREAK
11:15	Tapetal Cell and Orbicule Development in Corn P. C. Cheng (U.W.O. and Univ. of Chicago)
11:30	In Vitro Liquid Culture of Corn Inflorescences Patricia Polowick (U.W.O.)
11:45	Early Growth Characteristics of Hybrid and Non-Hybrid Poplar Clones Nancy Cain (Dept. of Horticultural Science, University of Guelph)
12:30	LUNCH AND POSTER PRESENTATIONS Room 217 B&G
2:30	DISCUSSION SESSION: Lead by D. B. Walden (U.W.O.) Plant Development at the Level of Transcription and Translation - Possibilities; Methods; Problems.
4:00	REFRESHMENTS Room 217 B&G

CORRELATION OF REPRODUCTIVE ANATOMY AND BEHAVIOR IN INDIVIDUALS OF CRATAEGUS CRUS-GALLI L., S.L. AND C. PUNCTATA JACQ.

T. A. Dickinson and J. B. Phipps. Department of Plant Sciences, University of Western Ontario, London, Ontario N6A 5B7

As part of a study of the relationship between breeding system, ploidy level, and pattern of phenetic variability in southern Ontario populations of the Crataegus crus-galli L. s.l. species complex, a preliminary comparison has been made of prevailing reproductive behavior between individuals of three morphotypes of crus-galli, and individuals of C. punctata Jacq. A possible hybrid between crus-galli and punctata which is male sterile has also been examined. Such a comparison may be made in either of two ways: anatomically, by comparing embryo sac development in fixed material; or by experimentally comparing particular aspects of the reproductive process in the living system. Together, these two approaches provide complementary information. While the occurrence of aposporous embryo sacs as well as sexual ones in the material of crus-galli complicates considerably the interpretation of the experimental results, it appears that the results obtained to date can nevertheless be accomodated by a hypothesis of facultative, pseudogamous agamosperny occurring in C. crus-galli, but not in C. punctata. Such a hypothesis, together with the self fertility found only in crus-galli, fits with and may explain in part the high degree of race differentiation exhibited by crus-galli, compared with the more continuous variability found in punctata. It may be possible to develop our concept of C. crus-galli s.l. further, by relating the occurrence of unreduced embryo sacs to the origin of polyploidy in this species complex, along the lines suggested by Harlan and de Wet (fertilization of unreduced gametes).

LEAF SURFACE WAX ANALYSIS OF CORN

TIMOTHY W. BLAKER
UNIVERSITY OF WESTERN ONTARIO

Leaves of corn (Zea mays L.) are extracted to obtain surface lipids (wax) by dipping in chloroform for 10 seconds. The chloroform extract is dried down in vacuo, and under nitrogen, to 0.1 ml. This sample is then analyzed directly via gas-liquid chromatography using OV-1 (non-polar) as the stationary phase. The results indicate that there are cultivar-specific patterns of wax composition in addition to species-specific patterns. These patterns can be recognized visually and are substantiated by calculation of the correlation coefficient, r, for two samples. Further analysis is planned to: 1) elaborate on the differences in wax composition between cultivars; 2) test the transmission of the wax phenotype from generation to generation by using reciprocal crosses; 3) determine if there is a developmental pattern of wax accumulation; and, 4) determine if the wax composition can be manipulated by environmental stress.

Daphne H. Bennett and A.L. [illegible]

Root anatomy and silicon distribution in the bamboo *Sasa palmata*.

Division of Natural Sciences, Glendon College, York University, Toronto, Ontario, M4K 3M6

Anatomy and silicon content of samples from the proximal end of adventitious roots of mature *Sasa palmata* plants were investigated using the SEM and electron-probe microanalyzer. High levels of silicon were confined to the endodermis, occurring within the inner and outer tangential, as well as the radial walls. The significance of the results is interpreted in terms of the tissue anatomy, and of silicon disposition in related tribes of the Poaceae.

CHENG PING-CHIN: Dept. of Anatomy, Univ. of Illinois Medical Ctr., Chicago, Ill., 60612. Dept. of Plant Sc., Univ. of Western Ontario, London, Ont., Canada N6A 5B7. - Tapetal cell and orbicule development in corn.

Corn anther consists of 4 layers of cells, the innermost layer is the tapetum- a nutritive layer supplying the developing microspores with nutrients. At the young microspore stage, orbicules (Ubisch body) develop on the locular surface of the tapetum. As part of our continuous study of corn anther tissue (1,2), we describe here tapetal cell and orbicule development by LM, SEM and TEM. Corn (*Zea mays*, var. Seneca 60) anthers at various stages were fixed in Cheng's fixative (3), post-fixed in OsO_4 and embedded in Spurr's medium. Semi-thin and thin sections were prepared for LM and TEM observations. SEM was used for the study of orbicules. The tapetal cell differentiated from the secondary parietal layer; in this early stage, the tapetal cell contains numerous free ribosomes and polysomes, and sparse endoplasmic reticulum. As the tapetal cell continues to differentiate, one notices an increase of endoplasmic reticulum and bound ribosomes. At the young microspore stage, the tapetal cell nuclei divide to form a binucleate cell, large perforations between adjacent tapetal cells then appear. It seems that cell organelles such as mitochondria, endoplasmic reticulum and plastids can move freely from cell to cell through the perforations; hence, the tapetal cell seems to form a syncytial type tapetum in contrast to the classic secretory type or amoeboid type tapetum. Orbicules develop at the young microspore stage, this is initiated by deposition of sporopollenin on the surface of pro-orbicule. Our result futher confirm the hypothesis previously proposed by us (4) for the mechanism of orbicule formation.(1): Can. J. Bot., 57, 578. (2): Can. J. Genet. Cytol., 22, 153. (3,4): Nucl. Sci. Comm. Monthly, ROC, (ISSN 0250 1651) 7, 1000 and 8, 1111.

In vitro liquid culture of corn inflorescences

Patricia L. Poloviak
Department of Plant Sciences
University of Western Ontario

It is assumed that plant growth regulators (PGR's) are important, possibly causal factors in the determination of sex expression in higher plants. There are basically three ways to test this hypothesis: measurement of endogenous levels of these substances, their exogenous application to the intact plant and their more direct addition *in vitro*.

Zea mays tassels and ears have been successfully cultured in sterile liquid medium. Immature inflorescences, approximately 1 cm long, weighing 10 mg, possessing spikelets with stamen and ovary primordia, grow and differentiate over a 16 day period up to a length of 20 cm with a fresh weight of up to 15 gm and resemble normal inflorescences in many ways.

Maximum growth of tassels in the basal medium is represented by plump florets with green, highly-veined, papery glumes. Stamens differentiate into anthers and filaments and, occasionally, microspores, complete with wall, are obtained. Such growth is made more consistent and is enhanced to the stage of pollen formation by the addition of low levels of kinetin (10^{-7} M).

Ears show more abnormal development in the form of glume production and, occasionally, stamen differentiation in the basal medium. Ovule development is only achieved with the addition of moderately high levels of zeatin (10^{-5} M). A general proliferation of organs and callus is also obtained with these levels of cytokinins.

These primary results indicate that the inflorescences of corn, especially the tassel, possess considerable potential for study via *in vitro* techniques.

Early Growth Characteristics of Hybrid and Non-hybrid Poplar Clones

Nancy Cain, Department of Horticultural Science, University of Guelph.

Production of fast-growing woody hybrids is becoming important in forestry for the short rotation production of wood. This wood could be used for fuel, gasohol production and even livestock feed. Research into early selection methods and the question of why certain clones display hybrid vigor may help in the identification of fast-growing clones. The purpose of this study was to characterize, in morphological and physiological terms, the vigourous growth and development of two hybrid clones compared with two non-hybrid poplar clones. The growth of these clones will be discussed, focusing on growth analysis, the partitioning of dry matter to various plant organs, and analysis of the photosynthetic area.

POSTER PRESENTATIONS

A study of the Zea mays L. mutant designated "tn", tinged.
Patricia Taylor * and W.G. Hopkins, Department of Plant Sciences, U.W.O., London, Ontario.

Dependent on the light intensity during growth, the tinged mutant may segregate into as many as 4 visual color classes. These classes are described as green, light-green, yellow-green, and a seedling lethal-yellow. The two classes chosen for this study were tinged-green and yellow-green. At high light intensity (500 uEm^{-2}s^{-1},PAR) the tinged-green resembled the control whereas the tinged yellow-green phenotype is characterized by: (a) low chlorophyll concentration overall and high chlorophyll a/b ratios as compared to +/+ and tinged/+; (b) deficiency of light harvesting chlorophyll a/b protein (LHPP) and associated polypeptides; (c) higher photochemical activities measured as electron transport through Photosystem I and II (2-2.5 x that of the normal); (d) a change in chloroplast ultrastructure resulting in fewer stacked thylakoids ; and (e) decreased light harvesting efficiency as measured by divalent cation effects.

These characteristics can be utilized in further studies on the interactions of light and the tinged mutation in an attempt to determine their synergistic role.

Calcium Oxalate Crystals in Plant Tissue; Methods of Identification

E. Spitzer and J.N.A. Lott

Biology, McMaster University

The identification of calcium oxalate crystals in plant tissue is difficult, especially when the crystals are small. Frequently crystals in plant tissues are assumed to be calcium oxalate. The actual determination of the chemical composition of such crystals is often avoided since the individual crystals or aggregates are usually small, not present in large numbers and/or embedded in other cellular material making their collection, purification and analysis difficult. Methods we have used, which have been successful to varying extents in the identification of such crystals, include: microscopic studies of crystal shape and birefringence, energy dispersive x-ray analysis, x-ray diffraction, electron diffraction, infra-red spectrometry, crystal solubility studies, microincineration and staining. Each of these methods has advantages and disadvantages. Their use would depend on the size, number and/or location of the crystals to be identified. Our experience with crystal identification is based upon studies of the small crystalline inclusions found in the protein bodies of some seeds.

SOME PRELIMINARY OBSERVATIONS ON THE USE OF HPLC FOR THE ISOLATION OF PLANT GROWTH REGULATORS.

D. Greyson, Andrea Patch and Dawn Bogseth, University of Western Ontario.

We have recently begun a study which attempts to isolate and characterize the gibberellins, and cytokinins associated with tassel and ear development in *Zea mays*. Our demonstration illustrates some of our preliminary observations on the chromatography and assays of these substances. These include:

1. Chromatography traces of standard samples of gibberellins and cotykinins.

2. Bioassay observation of recovered fractions from standard gibberellin and cytokinin mixtures.

3. Bioassay observations from recovered fractions of plant extract
    1) Gibberellins of Scarlet Runner Beans
    2) Gibberellins of immature corn ears.

4. Bioassays from chromatograph fractions of plant extracts for cytokinins
    1) Mature tomato leaves
    2) Rooted tomato leaves (high cytokinin levels).

5. Some examples of bioassays
    1) The tanginbozu dwarf rice assay for gibberellins
    2) The lettuce hypocotyl assay for gibberellins
    3) The soyabean hypocotyl assay for cytokinins.

Dr. Jim Thomas U. of T. Zool. port.doc